Optical trends in Interconnects

Ronald P. Luijten

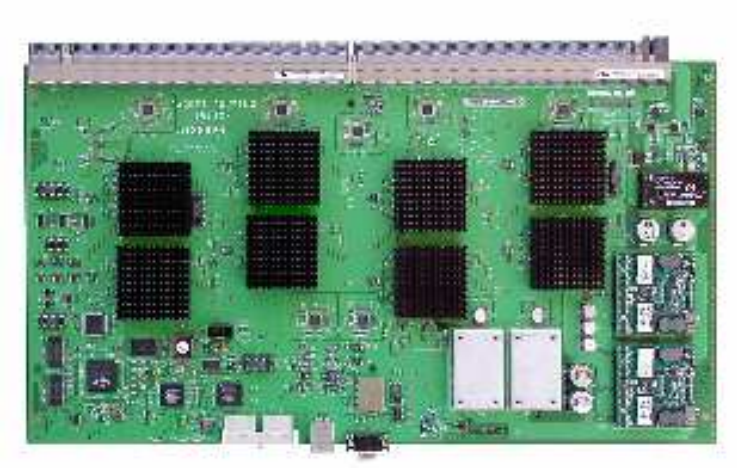
Manager high speed switching group

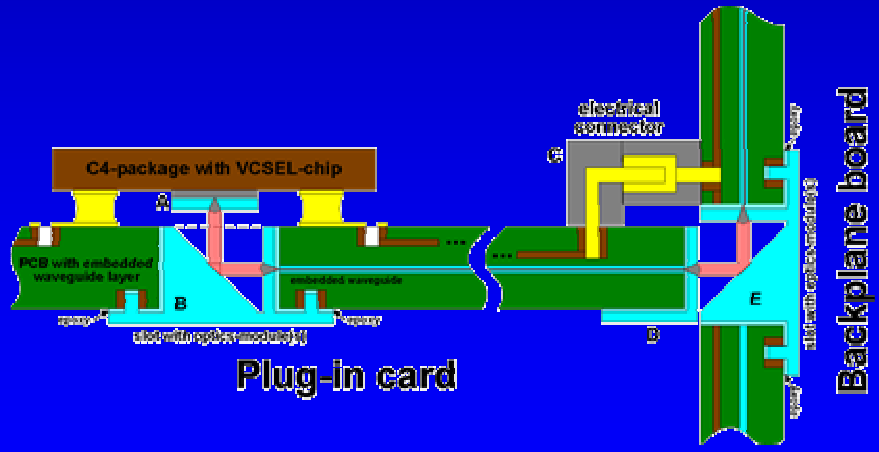
IBM Zurich Research Laboratory, Rüschlikon, Switzerland

My car story

Our Zurich lab research activities

… relevant to this audience





Lessons learned

FoM = Gbps / Watt * Inch^3

PRIZMA-5

30 W/15W

PRIZMA-4

24 W/10W

PRIZMA-3

15 W/5W

PRIZMA-2

10 W/1.5W

PRIZMA

10 W/ 1.5W

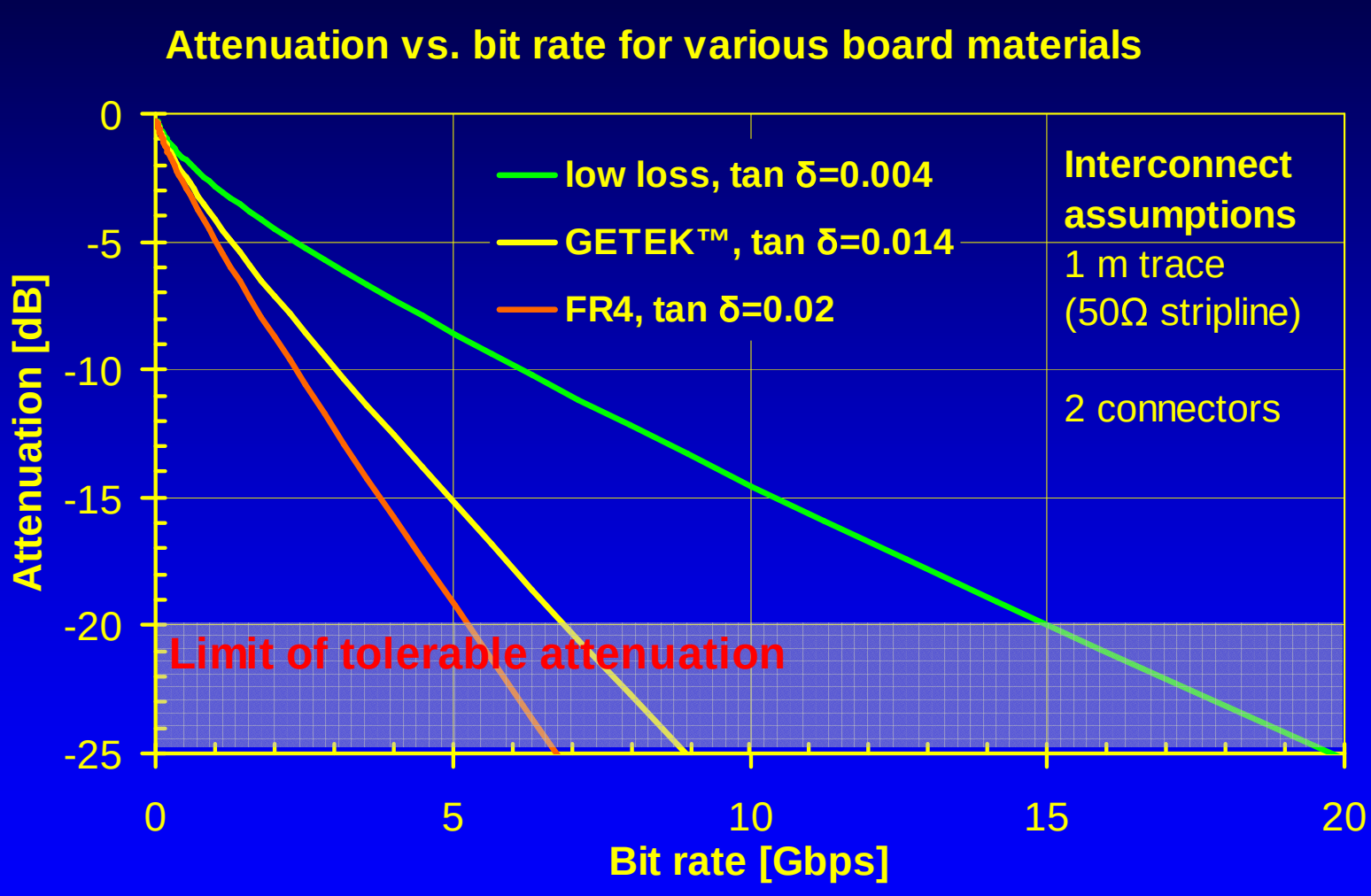
Lessons learned (2)

But
$ / Gbps also counts…

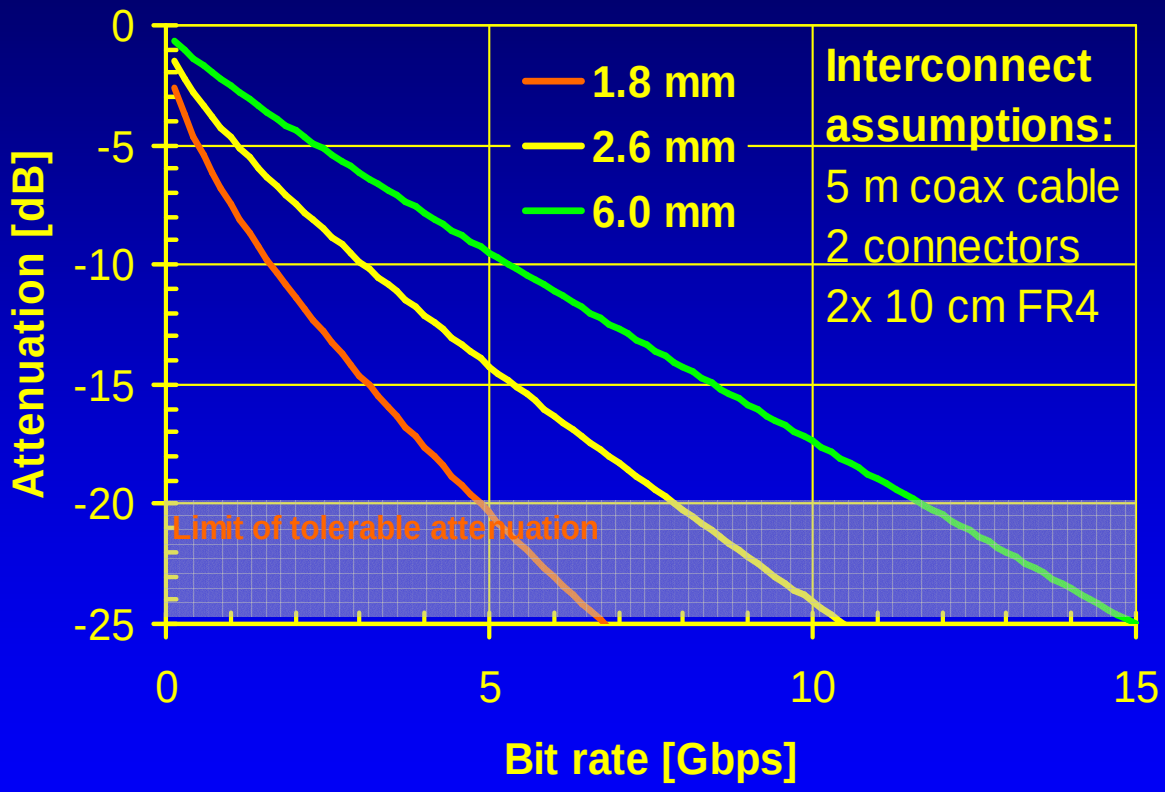
Stick with CMOS

Do not run at highest clock speed…

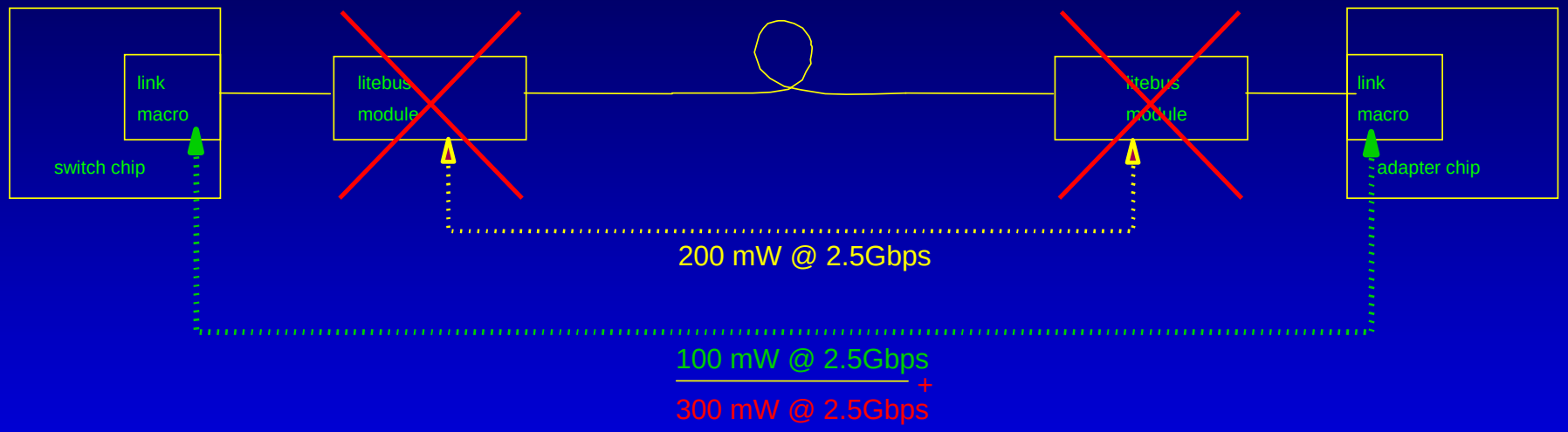
Board attenuation

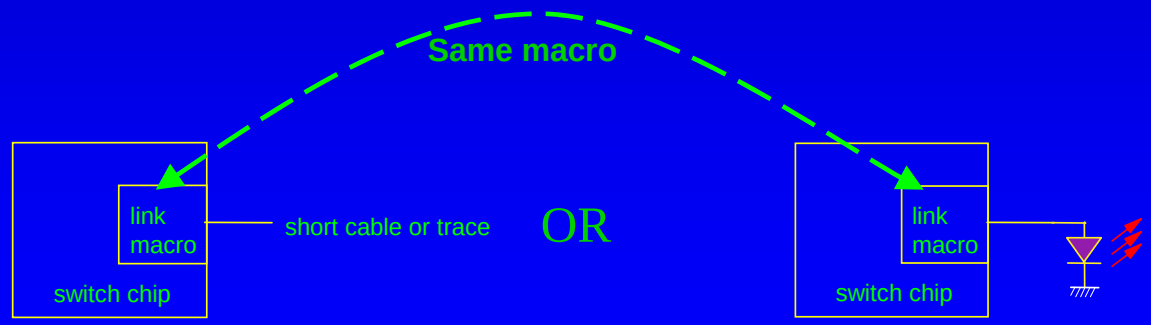


Cable attenuation

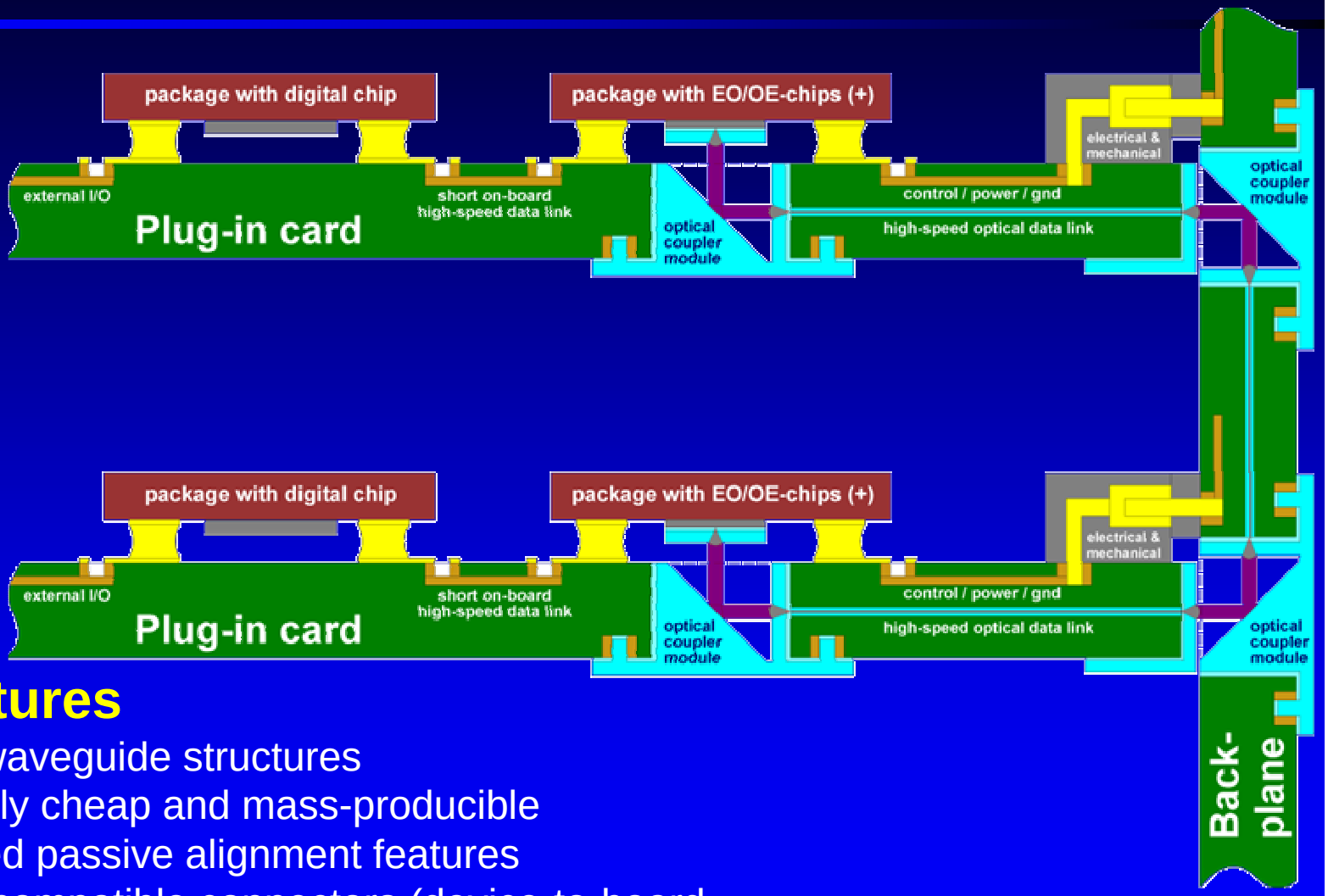


Optimizing power consumption





Opto-electronic link approach



- **Key Features**
  - Simple waveguide structures
  - Potentially cheap and mass-producible
  - Integrated passive alignment features
  - Various compatible connectors (device-to-board, board-to-backplane, backplane-to-fiber)

observations

Optics – do NOT give bandwidth
But give distance!

All optical components are there:
VCSEL
Detector
Fiber
FR4 waveguide

Except cost effective packaging…!

And all optical switching ??

Active optical switch element	1/2
Optical memory	no
Optical header processing	no

Concluding remarks

Optics coming intra-rack: power

Work needed in packaging

All optical switching:
more time needed

Next gen interconnect
Electronic processing
Optical transport